

## Safety of Log Transportation After Regulation and Training in the State of Georgia, USA

W. Dale Greene<sup>1</sup>  
Ben D. Jackson<sup>2</sup>  
Lois Shackleford<sup>3</sup>  
*University of Georgia*  
*Athens, GA, USA*

Robert L. Izlar<sup>4</sup>  
*Georgia Forestry Association, Inc.*  
*Norcross, GA, USA*

William Dover<sup>5</sup>  
*Georgia Public Service Commission*  
*Atlanta, GA, USA*

### ABSTRACT

Mechanical failure rates observed in highway accidents involving logging tractor-trailers have fallen significantly since Georgia subjected these vehicles to random roadside inspections. This improvement is attributed to both the regulation and the training efforts aimed at the log trucking community immediately before and after the implementation of the rules.

**Keywords:** *Transportation, logging trucks, regulations, training.*

### INTRODUCTION

Vehicles transporting logs are one of the most visible components of the forest products industry to the general public. These vehicles not only affect the industry's image, they also expose their owners and drivers to potential personal injury and financial liability if they are involved in a motor vehicle accident. Effective training of drivers and periodic highway truck inspections are essential for reducing accident potential.

Prior to July 1, 1991, the State of Georgia in the USA exempted trucks hauling raw forest products

from random roadside safety inspections conducted by the Georgia Public Service Commission (GaPSC). This exemption dated back to the time when logging was considered a seasonal part of agriculture that was often performed after other crops were harvested. By the late 1980s, many people in Georgia's forestry community considered this exemption to be outdated in light of the current level of technology in the logging industry. Logging and trucking contractors who worked diligently to keep safe vehicles on the road resented the fact that other operators exploited the exemption and gave the industry a poor image. As a result, the Georgia Forestry Association (GFA) began lobbying in 1987 to remove the exemption and allow the GaPSC to inspect trucks hauling raw forest products.

The Georgia Forest Products Trucking Rules [1,2] took effect July 1, 1991. They subjected both private and "for-hire" trucks hauling raw forest products with a gross vehicle weight rating (GVWR) of 22,000 kg (44,000 pounds) or more to random roadside inspections by GaPSC. Brakes, tires, lights, suspensions, truck frames, steering, and other mechanical systems are examined to determine condition and proper adjustment. Trucks with problems can be repaired at the site by the driver or may be given a restricted travel permit to return to their base for repairs. Severe violations require the truck to be placed out of service and either repaired on site or towed to a repair facility. As a practical matter, this legislation regulated logging tractor-trailers while leaving smaller, typically straight-frame trucks, unregulated.

About this same time, provisions of the Federal Motor Carrier Safety Act of 1986 were also taking effect. Mandatory drug testing of commercial vehicle drivers took effect January 1, 1992, and requires pre-employment, annual, random, suspicion of use, and post-accident drug tests of all commercial drivers. On April 1, 1992, all commercial drivers were required to possess a Federal Commercial Drivers Licence (CDL). To obtain this licence, drivers must pass one or more written or oral tests (depending on the vehicle and cargo hauled), a driving test, and obtain a medical certificate. This Federal licence eliminated the potential for drivers to hold licences from more than one state, which had made tracking their violations and licence suspensions more difficult.

GFA's Transportation Committee was concerned about the image of log trucking in Georgia and

*The authors are <sup>1</sup>Associate Professor, <sup>2</sup>Professor, and <sup>3</sup>Systems Support Specialist, respectively, at the Daniel B. Warnell School of Forest Resources; <sup>4</sup> and <sup>5</sup>, Executive Directors of their respective organizations.*

curious about the impact these new regulations would have on the safety record of log trucking. The news media in the state periodically ran articles discussing truck safety, often focusing specifically on logging vehicles. These articles usually cited statistics of unknown origin which were difficult to confirm or challenge. Because of this situation, the committee began searching for data to verify the allegations of the press and identify areas needing improvement in log transportation.

## OBJECTIVES

Project objectives were:

- (1) to determine factors associated with highway accidents involving logging vehicles in Georgia;
- (2) to provide a database for analyzing the impacts of government regulations and educational efforts on factors contributing to logging vehicle accidents; and,
- (3) to develop and/or revise training materials for educating logging truck drivers about common causes of logging truck accidents.

## STUDY METHODS

The Georgia Department of Public Safety (GaDPS) required all law enforcement officers in the state to use a standard form (DPS-523) to report traffic accidents on January 1, 1988. Under the category of "vehicle type," this form included "logging truck" and "logging tractor-trailer." In addition, GaDPS began maintaining the data from these forms in computer files. GFA began acquiring data on heavy truck accidents from GaDPS each year. These data were downloaded from magnetic tapes and analyzed on mainframe computer systems at the University of Georgia. A slightly revised form DPS-523 saw use beginning January 1994. This revision included some additional detail, but did not affect the variables monitored on the earlier form.

The information maintained by the state in computer files does not include every item found on form DPS-523. However, most of the pertinent information is retained. Frequency tables and graphs were used to identify factors frequently involved with logging truck accidents. Variables (e.g., driver age, time of day, vehicle manoeuvres, etc.) were evaluated to identify factors which might indicate a

higher accident frequency. Analysis of variance techniques and Duncan's multiple range test were used where appropriate to determine if logging trucks had different accident tendencies than other highway trucks. Discrete or tabular data were analyzed using Chi-square tests.

Trucks were separated into three classes for analysis -- logging tractor-trailers, logging trucks, and other trucks. Logging trucks and logging tractor-trailers were identified as such on the accident reporting form. Logging trucks include bobtail trucks and tandem-axle straight trucks. Logging tractor-trailers were those over 14 m (46 feet) in length with a GVWR of at least 22,000 kg (44,000 pounds). Other trucks included the DPS-523 categories of tractors without trailers, tractor-trailers under 46 feet in length, tractor-trailers over 46 feet in length, tractors with twin trailers, tri-axle trucks, and panel trucks.

Data were not available to indicate either the number of trucks of any type operating in Georgia or the number of miles they travel. Clearly, such data would be invaluable since it could be used to measure accident frequency on a miles-travelled basis.

Once the legislation was passed, an educational effort began. GFA and the University of Georgia Cooperative Extension Service sponsored 16 educational workshops for over 1,100 truck drivers. Workshops were designed to familiarize the owners and drivers with the content and enforcement of the new Georgia rules and Federal out-of-service criteria for drivers, vehicles, and hazardous materials. GaPSC personnel assisted with these training sessions by inspecting a logging tractor-trailer parked at the workshop site. The GaPSC enforcement officers clarified portions of the regulations that confused the loggers and drivers. In addition, their willingness to cooperate established a rapport and began a spirit of cooperation between the enforcement officers and the trucking community.

## RESULTS

During the seven years 1988-1994, heavy trucks of all types were involved in 68,229 highway accidents in the State of Georgia (Table 1). Only 3.8% of these involved logging tractor-trailers, while another 1.8% involved logging trucks. Nearly 95% of heavy truck accidents do not involve the transportation of raw forest products. These percentages did not change with the introduction of truck safety inspections on

**Table 1.** Number and percentage of truck accidents in Georgia by type of truck, 1988-1994, before and after regulation of logging tractor-trailers.

| Type of Truck            | Before Inspections<br>1/1/88-6/30/91 | After Inspections<br>7/1/91-12/31/94 |
|--------------------------|--------------------------------------|--------------------------------------|
| Logging Tractor-Trailers | 1,199<br>3.7%                        | 1,386<br>3.8%                        |
| Logging Trucks           | 567<br>1.8%                          | 635<br>1.8%                          |
| Other Heavy Trucks       | 30,550<br>94.5%                      | 34,072<br>94.4%                      |
| Total                    | 32,136<br>100%                       | 36,093<br>100%                       |

logging tractor-trailers.

Law enforcement officers working an accident scene can indicate up to four factors contributing to the accident. Some accidents had no contributing factors noted while others had the maximum of four indicated. Of the 26 different contributing factors which can be indicated, "mechanical or vehicle failure" was of particular interest (Table 2).

Before the inspections began, mechanical failure was cited more often than any other contributing factor in accidents involving logging tractor-trailers. In the 42 months following the start of inspections, mechanical failure dropped to the seventh most cited contributing factor. Before regulation, mechanical failure was cited in 10.9% of accidents compared to only 6.4% after inspections began. By comparison, mechanical failure is the ninth most cited factor for other heavy trucks, cited in 3.1% of accidents. Logging trucks, which are still not subject to inspections, continue to have mechanical failure as one of the three most common contributing factors, cited in one of every eight accidents.

Although the incidence of mechanical failure as a contributing factor declined substantially after the regulations, logging tractor-trailers are still twice as likely to have mechanical failure contribute to an accident than other heavy trucks. Several factors may account for this. Loggers often buy used trucks, thus their fleets are older (Table 3) and perhaps more prone to have mechanical failures. The work environment for a logging vehicle is much more primitive with unimproved woods roads and rela-

tively little travel on interstate highways. It typically involves local travel with a lot of brake usage and frequent sharp turns. Since the adoption of the regulations, the average age of logging tractor-trailers has declined by two years. The same change has also been observed for other heavy trucks. Perhaps as the other trucks are replaced more frequently, loggers will have newer used vehicles to purchase. The age of drivers of all types of trucks has increased. Logging tractor-trailers and other trucks both have drivers that average age 41 while drivers of logging trucks average age 43.

While mechanical failures were generally indicated in the contributing factors noted, the "vehicle condition" category on the form identified specific mechanical failures. Here the officer can indicate if tire failure, brake failure, improper lights, steering failure, slick tires, or other specific causes were noted on each vehicle involved in the accident (Table 3).

Rates of tire failure did not change after the regulation on either logging tractor-trailers or logging trucks. A decrease in tire failure was expected for logging tractor-trailers but was not observed. A slight but significant increase was noted for other heavy trucks.

Brake failure declined significantly for both logging tractor-trailers and other heavy trucks, however, no change was observed for logging trucks. This decrease was expected for logging tractor-trailers as a result of the inspections. No change was expected or observed for logging trucks.

**Table 2.** Percentage of accidents with contributing factors cited by law enforcement officers investigating truck accidents in Georgia, 1988-1994, before and after regulation of logging tractor-trailers.

| Contributing Factor        | Logging<br>Tractor-Trailers |       | Logging<br>Trucks |       | Other Heavy<br>Trucks |       |
|----------------------------|-----------------------------|-------|-------------------|-------|-----------------------|-------|
|                            | Before                      | After | Before            | After | Before                | After |
| None                       | 28.6                        | 33.9  | 29.8              | 31.0  | 35.9                  | 33.6  |
| Driver Under Influence     | 0.8                         | 1.1   | 1.9               | 1.1   | 0.5                   | 0.5   |
| Surface Defects            | 0.6                         | 0.2   | 0.5               | 0.5   | 0.3                   | 0.2   |
| Mechanical Failure         | 10.9                        | 6.4   | 12.9              | 11.0  | 3.8                   | 3.1   |
| Driverless Vehicles        | 0.7                         | 0.5   | 0.7               | 1.4   | 0.3                   | 0.2   |
| Driver Lost Control        | 7.4                         | 7.9   | 6.2               | 3.5   | 4.9                   | 4.0   |
| Misjudged Clearance        | 9.3                         | 7.5   | 6.5               | 5.8   | 11.5                  | 8.5   |
| Improper Backing           | 2.6                         | 2.2   | 5.3               | 5.0   | 6.8                   | 5.9   |
| Changed Lanes Improperly   | 1.4                         | 3.4   | 1.6               | 4.9   | 12.1                  | 11.1  |
| No or Improper Signal      | 1.3                         | 0.4   | 1.6               | 0.8   | 0.3                   | 0.3   |
| Following Too Close        | 8.2                         | 9.6   | 8.3               | 11.3  | 9.5                   | 10.1  |
| Exceeding Speed Limit      | 1.3                         | 1.2   | 1.2               | 0.2   | 0.6                   | 0.4   |
| Too Fast for Conditions    | 9.1                         | 6.6   | 3.9               | 4.6   | 4.2                   | 2.9   |
| Disregard Stop Sign/Signal | 3.2                         | 1.6   | 2.3               | 1.7   | 1.2                   | 1.4   |
| Wrong Side of Road         | 3.1                         | 2.2   | 2.5               | 1.6   | 1.3                   | 1.3   |
| Improper Passing           | 2.3                         | 1.8   | 2.3               | 1.7   | 1.2                   | 1.1   |
| Improper Turn              | 3.8                         | 3.3   | 3.9               | 2.8   | 6.2                   | 4.8   |
| Passing Stopped School Bus | 0.1                         | 0.1   | 0.2               | 0.0   | 0.0                   | 0.0   |
| Pedestrian Violation       | 0.0                         | 0.0   | 0.0               | 0.0   | 0.0                   | 0.0   |
| Failed to Yield            | 8.7                         | 7.6   | 7.6               | 6.9   | 7.0                   | 6.2   |
| Disregard Police Officer   | 0.1                         | 0.1   | 0.0               | 0.2   | 0.0                   | 0.0   |
| Weather Conditions         | 2.6                         | 2.6   | 1.1               | 1.6   | 2.3                   | 2.3   |
| Object or Animal           | 2.2                         | 1.9   | 0.5               | 1.3   | 2.2                   | 1.8   |
| Driver Condition           | 0.3                         | 0.8   | 0.7               | 0.5   | 0.6                   | 0.9   |
| Other                      | 10.3                        | 10.9  | 12.0              | 12.6  | 9.1                   | 9.8   |

**Table 3.** Statistical comparison between types of trucks involved in highway accidents, before and after regulation of logging tractor-trailers, 1988-1994.

| Variable            | Truck Type               | Before | After  |
|---------------------|--------------------------|--------|--------|
| Vehicle Age, years  | Logging Tractor-Trailers | 12.1 a | 10.2 b |
|                     | Logging Trucks           | 18.8 a | 13.6 b |
|                     | Other Heavy Trucks       | 10.3 a | 8.1 b  |
| Driver Age, years   | Logging Tractor-Trailers | 37.0 a | 40.6 b |
|                     | Logging Trucks           | 34.9 a | 43.4 b |
|                     | Other Heavy Trucks       | 36.3 a | 41.0 b |
| Tire Failure, %     | Logging Tractor-Trailers | 1.18 a | 1.42 a |
|                     | Logging Trucks           | 1.47 a | 1.81 a |
|                     | Other Heavy Trucks       | 0.62 a | 0.78 b |
| Brake Failure, %    | Logging Tractor-Trailers | 6.51 a | 3.55 b |
|                     | Logging Trucks           | 7.50 a | 5.91 a |
|                     | Other Heavy Trucks       | 1.69 a | 1.39 b |
| Improper Lights, %  | Logging Tractor-Trailers | 2.05 a | 0.87 b |
|                     | Logging Trucks           | 3.10 a | 1.64 a |
|                     | Other Heavy Trucks       | 0.23 a | 0.24 a |
| Steering Failure, % | Logging Tractor-Trailers | 0.59 a | 0.24 a |
|                     | Logging Trucks           | 0.42 a | 0.18 a |
|                     | Other Heavy Trucks       | 0.12 a | 0.09 a |
| Slick Tires, %      | Logging Tractor-Trailers | 3.46 a | 1.88 b |
|                     | Logging Trucks           | 3.50 a | 2.17 a |
|                     | Other Heavy Trucks       | 0.27 a | 0.22 a |
| Other Failure, %    | Logging Tractor-Trailers | 4.74 a | 2.72 b |
|                     | Logging Trucks           | 3.50 a | 4.92 a |
|                     | Other Heavy Trucks       | 1.39 a | 1.35 a |

Means for a variable within a row with different letters are significantly different at the 5% level.

A dramatic and significant decline in improper lights was noted for logging tractor-trailers. This was expected as a result of the inspections and training. No change in this variable was expected or observed for logging trucks or other heavy trucks.

Steering failures rarely occur on any vehicle and did not change after the regulations for any class of truck. However, logging trucks and logging tractor-trailers both have sharply higher rates of steering failure than other heavy trucks, perhaps due to their work environment.

Slick tires were noted significantly less often on logging tractor-trailers after the inspections than before, but their incidence did not change for logging trucks or other heavy trucks. Other failures, which includes any failure (suspension, frame, etc.) not included in the above categories, also declined significantly for logging tractor-trailers but remained unchanged for the other two classes of trucks.

The importance of a conscientious, well-trained driver cannot be overstated in making safe transportation a reality. The Federal Motor Carrier Safety Act of 1986 requires mandatory drug testing of all drivers of commercial vehicles beginning January 1, 1991, and a Federal commercial drivers licence by April 1, 1992. Alcohol and drugs are involved in fewer than 2% of heavy truck accidents (Table 4). Mandatory post-accident drug testing should be reducing the indication on the form of

"not known if under the influence." However, little if any change in this category was noted.

The percentage of drivers of logging trucks under the influence of alcohol fell dramatically but was still nearly twice as high after the regulations as the percentage of DUI drivers of logging tractor-trailers and three times as high as the percentage of DUI drivers of other heavy trucks. Perhaps the local nature of travel with logging vehicles makes alcohol more of a temptation than to long-haul drivers.

Drug usage increased with drivers of logging tractor-trailers more than three-fold after the new regulations took effect. Mandatory post-accident testing may identify drug use that was missed before tests were required. While a sharp increase in drug use was noted, it occurs in fewer than 1% of all accidents involving logging tractor-trailers (fewer than three accidents per year statewide).

#### SUMMARY

Mechanical failure rates of logging tractor-trailers in Georgia fell significantly after the passage of regulations allowing inspection of logging tractor-trailers and the associated educational efforts to prepare drivers and owners. The mechanical failure rate of logging trucks, which were not regulated by the Act, did not change. While the mechanical failure rate of logging tractor-trailers has been sharply reduced, it still exceeds the rates found for

**Table 4.** Condition of truck drivers involved in highway accidents in Georgia, 1988-1994, before and after regulation of logging tractor-trailers.

| Driver Condition            | Logging Tractor-Trailers |       | Logging Trucks |       | Other Heavy Trucks |       |
|-----------------------------|--------------------------|-------|----------------|-------|--------------------|-------|
|                             | Before                   | After | Before         | After | Before             | After |
| Not Drinking                | 95.4%                    | 94.2% | 90.1%          | 93.4% | 94.0%              | 95.0% |
| Drinking, Not U.I.          | 0.1                      | 0.1   | 0.0            | 0.0   | 0.2                | 0.2   |
| Not Known if U.I.           | 3.4                      | 3.6   | 7.1            | 5.2   | 4.6                | 4.0   |
| U.I. Alcohol                | 0.9                      | 0.9   | 2.3            | 1.4   | 0.5                | 0.4   |
| U.I. Drugs                  | 0.2                      | 0.7   | 0.0            | 0.0   | 0.1                | 0.1   |
| Physical/Fatigue/Distracted | 0.0                      | 0.5   | 0.4            | 0.0   | 0.3                | 0.3   |

other heavy trucks. Possible explanations include the much harsher work environment for logging vehicles, a greater dependence on older, used vehicles, and a need for further training of drivers and owners.

This study shows that improvements are possible with increased attention to truck safety by both government regulators and the owners and drivers of logging vehicles. In addition, the information obtained from regular analysis of accident data has been very useful for designing training materials for use in educational efforts.

#### **LITERATURE CITED**

- [1] O.C.G.A. 1990. Georgia Forest Products Trucking Act. Official Code of Georgia Annotated 46-1-1c(7)(x), 46-1-1(c)(11).
- [2] United States Department of Transportation, Federal Highway Administration. 1992. Federal Motor Carrier Safety Regulation: Title 49 CFR Parts 40, 325, 383, 385, 386, 390-397, 399. Amer. Trucking Assoc., Alexandria, VA. 171 pp.